



## Agency Costs, Mispricing, and Ownership Structure

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*Standard theories of ownership assume insiders ultimately bear all agency costs and therefore act to minimize conflicts of interest. However, overvalued equity can offset these costs and induce listings associated with higher agency costs. We explore this possibility by examining a sample of public listings of Japanese subsidiaries. Subsidiaries in which the parent sells a larger stake and subsidiaries with greater scope for expropriation by the parent firm are more overpriced at listing, and minority shareholders fare poorly after listing as mispricing corrects. Parent firms often repurchase subsidiaries at large discounts to valuations at the time of listing and experience positive abnormal returns when repurchases are announced.*

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A large literature suggests that corporate ownership and capital structure decisions reflect attempts to mitigate agency problems between various stakeholders. A common idea is that corporate ownership is organized so as to maximize firm value, accounting for potential conflicts of interest between a controlling shareholder and minority investors. Following Jensen and Meckling (1976), this literature assumes that markets are efficient, which means that minority investors anticipate the full extent of agency problems and form unbiased estimates of future cash flows. Under this view, minority investors receive a fair return on their capital, which implies that controlling shareholders ultimately bear all agency costs that they create. The greater is the opportunity for a controlling shareholder to take advantage of minority investors, the more expensive it is for him to raise outside capital.

However, recent research calls into question whether investors correctly price new equity and debt issues. Ritter (1991), Loughran and Ritter (1995), Graham and Harvey (2001), and Baker and Wurgler (2000) provide evidence that firms attempt to time their equity and debt issuance according to market conditions.<sup>1</sup> Loughran and Vijh (1997), Shleifer and Vishny (2003), Rhodes-Kropf and Viswanathan (2004), Savor and Lu (2009), and Bekkum, Smit, and Pennings (2011) argue that merger activity is influenced by mispricing. Nanda (1991), Slovin and Sushka (1995, 1997), and Schill and Zhou (2001) point out that equity carve-outs in part reflect the differential mispricing of parent and subsidiary shares.

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<sup>1</sup>See Henderson, Jegadeesh, and Weisbach (2006) and Kim and Weisbach (2008) for international evidence of market timing. Chang et al. (2010) analyze market timing in Japan.

In this paper, we examine how market timing considerations influence the link between corporate ownership and agency problems. Our main idea is that controlling shareholders take advantage of stock market mispricing to offset the burden of agency costs. Consider a controlling shareholder who is deciding whether to sell equity in a part of his operations. After selling these shares, an agency problem develops: the shareholder can divert resources from the operations for his own private benefit but in doing so bears the costs of diversion. If markets are efficient, investors anticipate diversion *ex ante* and price the outside equity accordingly. Absent other considerations, the controlling shareholder does not have an incentive to sell shares and engage in diversion.

What, then, motivates the controlling shareholder to sell equity to outside investors? The existing literature proposes a few potential benefits, but the prevailing view, summarized by Shleifer and Wolfenzon (2002) and Morck, Wolfenzon, and Yeung (2005), is that controlling shareholders sell shares to outsiders only when internal capital is inadequate to fund attractive investment opportunities.<sup>2</sup> The controlling shareholder trades off the agency costs of inefficient ownership structure against the benefit of being able to undertake positive net present value (NPV) projects. Equity mispricing induces a similar tradeoff: the controlling shareholder trades off the benefit of selling overvalued equity against the agency costs he would incur after listing. The greater is the mispricing, the more the controlling shareholder wants to sell, and thus the more costly are the subsequent agency problems he is willing to endure.

To explore the above idea empirically, we study the relationship between stock market mispricing and agency costs in a sample of 431 publicly listed subsidiaries in Japan. Although capital markets are highly developed, minority shareholder rights are weak when it comes to policing self-dealing transactions. By retaining effective control of their subsidiaries after listing, parent firms leave open the possibility of taking advantage of minority shareholders. Quite recently, concerns about the mistreatment of minority shareholders of public subsidiaries have attracted the attention of Japanese lawmakers and regulators.<sup>3</sup> An important advantage of the setting for our analysis is that parent firms in our sample do not appear to be financially constrained, lending more credence to explanations for listing that relate to stock market mispricing.

Foley, Greenwood, and Quinn (2008) provide a case study of one of these listings, NEC Electronics (NECE), the semiconductor subsidiary of Japanese electronics conglomerate NEC. Following its listing in 2003, NECE incurred excessively high capital expenditures and research and development (R&D) expenses to develop microchips used in NEC's phones and charged its parent low transfer prices. NECE's stock underperformed relative to the market and to the parent firm. Below we show that the performance of NECE is representative: parent firms list subsidiaries when market and industry valuations are high, and over the following two years, average cumulative subsidiary returns are  $-8.74\%$ , while average cumulative parent returns are  $2.64\%$ .

It is difficult to detect agency costs directly. Therefore, our large sample tests are based on predictions that relate the characteristics of listed firms—particularly characteristics that proxy

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<sup>2</sup>See Almeida and Wolfenzon (2006) for a theoretical treatment. Other motives to sell equity to outsiders in the presence of agency costs include a risk-averse controlling shareholder's desire to diversify, benefits from learning the market value of certain operations (Perotti and Rossetto, 2007), and gains from the political power that can accompany control of a large business group (Morck, Wolfenzon, and Yeung, 2005).

<sup>3</sup>Partially in response to pressure from investors, the Tokyo Stock Exchange (TSE) characterized subsidiary listings as "not necessarily a desirable capital policy for various market players including investors" and imposed enhanced disclosure requirements for companies with a controlling shareholder, particularly around related-party transactions (TSE Listing Examination 235, October 29, 2007). In a recent survey, the TSE found that 32.4% of listed subsidiaries had essentially no policy ensuring the fair treatment of minority shareholders in related-party transactions (TSE, 2009, p. 13).

for the scope for agency problems—to postlisting returns. Our first prediction is that subsidiaries in which the controlling shareholder sells a larger share of equity should have lower stock market returns than other firms following their listing. Burkart, Gromb, and Panunzi (1998) and LaPorta et al. (2002) explain that the incentive to divert resources from minority shareholders is particularly strong when a large shareholder retains effective control but limited cash flow rights. Equity must be particularly overvalued to induce the controlling shareholder to incur the potentially large agency costs. We show that subsidiaries in which the parent firm maintains a minority ownership stake—defined as ownership between 20% and 50% of the firm—exhibit significant stock market underperformance.

Our second prediction exploits cross-sectional variation in the potential for agency problems. Listings with greater ex ante scope for agency problems should occur when equity is more overvalued. In these instances, the controlling shareholder can be expected to divert more resources from minority shareholders, and these listings require higher ex ante valuations to offset the costs of diversion. In our data, we identify subsidiaries that have a sales relationship with the parent firm as being particularly prone to agency problems. Because transfer pricing regulations in Japan are weak, parent firms can use transfer pricing to divert resources from subsidiaries. Over two years after listing, these subsidiaries earn monthly risk-adjusted returns of  $-71$  basis points.

Our last prediction relates to the actions of the parent company after mispricing has reverted. Once the mispricing has reverted, the parent company has a strong incentive to repurchase its listed subsidiaries and eliminate agency costs. This is because agency costs, such as the costs of covering up diversion, are likely to be recurring. In our data, approximately a quarter of the subsidiaries listed during the sample period are repurchased by their parent firms, typically at a significant discount to the valuations at the time of listing. The median buy-and-hold return earned by a stockholder of a repurchased subsidiary from the beginning of the month following listing to the repurchase date is  $-41.5\%$ . When repurchases are announced, both the acquiring parent and the target subsidiary experience positive abnormal returns. Acquiring parent returns average about 18% of the market capitalization of repurchased subsidiaries, suggesting that parent firms capture many of the gains from eliminating ownership structures that are prone to agency problems. In summary, stock market mispricing facilitates the creation of ownership structures prone to agency problems, and these structures are often dismantled once prices correct themselves.

The ideas here build on two strands of research. First, we draw on research that documents the expropriation of minority shareholders in different countries. Bertrand, Mehta, and Mullainathan (2002) find evidence of tunneling within Indian business group structures, while Bae, Kang, and Kim (2002) and Baek, Kang, and Lee (2006) illustrate how group relationships allow insiders to use mergers and acquisitions as well as security issuance to benefit controlling shareholders. Claessens et al. (2002) and LaPorta et al. (2002) show that corporate valuations are lower when minority shareholder protection is weaker. These papers do not, however, test whether agency problems are fully priced at the time of listing.

Second, we contribute to research on equity carve-outs, recently surveyed by Eckbo and Thorburn (2008). While Nanda (1991), Slovin and Sushka (1995, 1997), and Schill and Zhou (2001) point out that equity carve-outs in part reflect the differential mispricing of parent and subsidiary shares, they do not consider the trade-off between the mispricing of subsidiary equity and the agency conflicts created by listing subsidiaries while retaining control.<sup>4</sup> Other work on equity carve-outs analyzes the implications of improved corporate focus, access to financing,

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<sup>4</sup>Ghosh et al. (2012) also present evidence that equity carve outs are not efficiently priced at the time of listing.

and the process of restructuring.<sup>5</sup> Our paper is also related to the work of Atanasov, Boone, and Haushalter (2010), who argue that parent firms in the U.S. behave opportunistically toward their publicly listed subsidiaries. The authors show that such subsidiaries trade at a discount relative to their peers.

The next section develops our main predictions. Section II provides a brief background on the protection of minority shareholders under Japanese law, while Section III describes our data. Section IV analyzes the valuations and performance of subsidiary listings. Section V examines what happens to the ownership of subsidiaries following their listing. Section VI concludes.

## I. Hypothesis Development: Stock Market Mispricing and Ownership Structure

Our three main hypotheses can be developed in an extension of a standard agency model in which a controlling shareholder must decide whether to sell a fraction of the equity in his firm to dispersed outside investors. We discuss the basic intuition for our hypotheses here and relegate a more formal algebraic treatment to the Appendix.

Jensen and Meckling (1976) provide the standard framework for understanding the role of agency costs on the behavior of the firm. Consider a shareholder who owns all of the equity in a business and who is given the opportunity to sell some fraction of it. Once a portion of the equity has been sold, an agency problem arises: the controlling shareholder prefers to divert resources to himself instead of receiving only his pro rata share of the cash flows. Such diversion can occur through a number of channels, including transfer pricing, inefficient perk consumption, and outright theft. Diverting benefits is costly, and these costs are often assumed to be borne by the controlling shareholder and to include deadweight costs. Shleifer and Wolfenzon (2002) allow these costs to vary inversely with the degree of legal protection enjoyed by minority shareholders. In addition, if we interpret the costs as reflecting efforts to conceal resource diversion, then a portion of them is deadweight. If markets are efficient, then the price that minority shareholders are willing to pay for equity reflects the amount of diversion. Any costs of diversion that the controlling shareholder bears act as a deterrent to selling shares.

This framework does not consider the possibility that equity may be overvalued. However, a significant body of work, including that of Ritter (1991) and Loughran and Ritter (1995) document that new listings underperform the market over three- to five-year horizons. This underperformance has been interpreted as an indicator of mispricing, suggesting that, by listing shares, managers take advantage of investors periodically being overoptimistic about the valuation of firms.<sup>6</sup>

What happens when we allow for the equity to be overvalued?<sup>7</sup> Intuitively, the controlling shareholder trades off the benefit of selling overvalued equity against the costs he bears when engaging in diversion. By selling shares to outside investors, the controlling shareholder gets

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<sup>5</sup>For examples of papers on these topics, see Schipper and Smith (1986), Klein, Rosenfeld, and Beranek (1991), Nanda (1991), Slovin and Shuska (1995, 1997), Vijh (2002), and Perotti and Rossetto (2007).

<sup>6</sup>A number of other papers in corporate finance take stock market mispricing as a given and use it to derive consequences for corporate behavior (for examples, see Stein, 1996; Shleifer and Vishny, 2003). Like these papers, our focus is on the consequences of mispricing.

<sup>7</sup>Nanda (1991) models the parent firm's decision to sell its own equity versus equity in a subsidiary. In his model, the relative valuation of parent and subsidiary equity plays an important role; however, he does not consider the agency conflicts created by listing subsidiary shares. Therefore, our model focuses on the tradeoff between mispricing and agency costs, a tradeoff that has not been explored in the literature.

more than if he did not sell any shares at all and retained full control. A higher degree of equity overvaluation is required to motivate the shareholder to sell shares in situations where the amount of subsequent diversion and the costs of diversion that the controlling shareholder bears are higher. In short, by offsetting the agency costs, mispricing creates scope for expropriation. The more diversion that is expected to take place, the higher is the mispricing required to induce the controlling shareholder to list.

One empirical challenge is the difficulty of observing diversion directly. However, we do observe the characteristics of firms that choose to list equity, as well as their stock returns following listing, which we use as a noisy proxy for ex ante mispricing. Our empirical predictions relate to these features of our data.

Our first prediction is that listings in which the controlling shareholder sells a large fraction of shares, which we denote by  $\alpha$ , should occur when equity valuations are high, and these listings should experience poor returns postlisting. The idea is that more diversion takes place when the separation between the cash flow and control rights of the controlling shareholder is larger, and therefore mispricing must be larger to sustain the high costs of diversion. We test this prediction by analyzing subsidiaries in which the parent's ownership stake after listing is between 20% and 50%.

Our second prediction is that listings for which the ex ante scope for agency problems is high should also occur when equity valuations are high and should experience poor equity returns after listing. We implement this idea by identifying subsidiaries that have a sales relationship with their parent firm. The weak nature of transfer pricing regulations in Japan creates opportunities for diversion for these types of firms. When these subsidiaries are listed, controlling shareholders divert more resources, and therefore more mispricing is required to induce the controlling shareholder to list in the first place.

Our third prediction concerns what happens if the controlling shareholder sells overpriced equity and mispricing corrects. The costs of diversion that are borne by the controlling shareholder are typically assumed to be recurring, so he has an incentive to repurchase listed shares to eliminate these costs. Thus, in our data we would expect to see parent companies attempt to repurchase subsidiaries and to do so at a discount to their valuation at the time of listing, thus reflecting the correction of the initial overvaluation. Furthermore, because in practice minority shareholders are in a weak bargaining position when repurchases take place, controlling shareholders are likely to capture most of the benefits of eliminating agency costs and may avoid having to share gains in the form of high takeover premia. This is particularly true in Japan, where minority squeeze-out regulations provide little protection to minority shareholders. To the extent that the controlling shareholders are able to capture the benefits of the eliminated agency costs, they should experience positive returns when repurchases are announced.

## II. Rights of Minority Shareholders in Publicly Listed Subsidiaries in Japan

The discussion above assumes that minority shareholders may be expropriated by a controlling owner. While this assumption is commonplace in the law and finance literature, here we discuss its applicability to subsidiary listings in Japan. We follow discussions of Japanese corporate law by Nishiyama (2007) and Kamiyama (2008) as well as the Tokyo Stock Exchange's (TSE's) listing guidelines, and where possible, we contrast Japanese law with the U.S. benchmark.

Courts in most countries prohibit outright theft from minority shareholders, but beyond obvious cases of stealing there is substantial variation in what is permitted. Johnson et al. (2000) explain that two common legal principles applied by courts are the duty of care and the duty of loyalty. The duty of care requires directors to act in a reasonable, prudent, and rational way, and as such

does not offer much protection to minority shareholders. The duty of loyalty, or fiduciary duty, addresses conflicts of interest specifically.

In the United States, directors are endowed with both the duty of care and the duty of loyalty and therefore have fiduciary duties to the company and its shareholders. In Japan, directors have a duty of care, but the judiciary has avoided detailing or enforcing regulations that restrict breaches of fiduciary duty. Directors must obey the company's organizational documents and must act in good faith but are not required to act in the interest of minority shareholders.

Controlling shareholders in the United States also have both the duty of care and the duty of loyalty; controlling shareholders in Japan have neither. In Japan, minority shareholders' only protection from undue pressure by a controlling shareholder comes from the board of directors. In practice, however, directors of subsidiary firms do not have much incentive to protect the interests of minority shareholders, especially since many directors are former or current executives of the parent company. Regulators at the TSE have expressed concern about this situation, remarking that "relationships between parent companies and minority shareholders of the subsidiary entail potential conflicts of interest, and there is a risk that the subsidiary conducts its business for the benefit of the parent to the detriment of the interest of overall shareholders" (TSE, 2007).

The broad guidelines of the law have particularly significant implications for minority shareholders of subsidiaries with regard to three issues: (a) related-party transactions, (b) usurped business opportunities, and (c) minority squeeze-outs.

#### **A. Related-Party Transactions**

Related-party transactions must be disclosed and are subject to audit, but parent and subsidiary companies often share auditors, and there is no burden of proof with respect to fairness. This is in contrast to the United States, where all transactions between a controlling shareholder and the company are subject to court scrutiny, and where the burden of proof rests with the controlling shareholder to show that transactions occurred at an arms' length price.

#### **B. Usurped Business Opportunities**

A parent company may influence the subsidiary indirectly and particularly in ways that are difficult to prove in court. A parent company may force the subsidiary to continue in a particular business venture that provides benefits for the parent or may prohibit the subsidiary from competing with it in a particular area of business. In the case of NEC Electronics, for several years after listing, the subsidiary incurred significant excess R&D costs and capital expenditures to enhance the competitive position of its parent's products (Foley et al., 2008).<sup>8</sup> Under U.S. law, controlling shareholders may not direct activity in this manner and may not take a business opportunity for themselves if the opportunity is in the subsidiary's interest and scope of competency. In the event of a breach, the subsidiary can attempt to recover benefits from the controlling shareholder, although such cases are difficult to win. In Japan such fiduciary responsibility does not even exist.

#### **C. Minority Squeeze-Outs**

Squeezing out a minority investor by means of a cash-out merger is a related-party transaction that in the U.S. invites a high degree of court scrutiny. The majority shareholder bears the

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<sup>8</sup>In the specific case of NEC Electronics, it is also reasonable to argue that the excess investment was inefficient in that production at the subsidiary was done at an inefficient scale so that with perfect alignment of incentives between NEC Electronics and NEC it would have been cheaper to purchase semiconductors from another supplier.

burden of proving that the squeeze-out is fair to all shareholders. As with other related-party transactions, controlling shareholders have no fiduciary duty in Japan. A court can revoke a shareholder resolution approving a squeeze-out only if it is clearly and grossly unfair. Dissenting shareholders have appraisal rights, but these are of limited value given the ability of parents to take actions that affect valuations. Japanese regulators have become increasingly concerned about some recent cases in which parents have repurchased subsidiaries at large discounts to listing prices soon after listing them.<sup>9</sup> Yoshimoto Kogyo bought back Fandango 19 months after listing it, and NEC bought back NEC System Technologies 20 months after listing it. The cumulative buy-and-hold returns from the month after listing until the time of repurchase were -71% and -39%, respectively.

### III. Publicly Listed Subsidiaries in Japan, 1980-2005

We collect a sample of subsidiary listings from Toyo Keizai's *Japan Company Handbooks*, which provide background information on all publicly listed companies in Japan. We identify subsidiary listings by scanning volumes from 1980, 1985, 1987, 1990, 1995, 2000, and 2005 for firms with corporate owners.<sup>10</sup> We define a newly listed firm to be a subsidiary if a publicly listed Japanese corporate parent owns at least 20% of the equity before and after listing. The 20% cutoff corresponds to the definition of effective control used by LaPorta et al. (1999).<sup>11</sup> In the vast majority of cases, we are able to determine prelisting ownership stakes from the firm's first appearance in the handbooks. In a few cases, we rely on handbook descriptions stating that firms are subsidiaries. In the cases for which we have ownership data for subsidiaries before and after listing, parent ownership typically falls by a substantial margin at the time of listing. From our initial list, we exclude firms with more than one blockholder that owns at least 20% of the equity at the time of listing, subsidiaries in regulated sectors (utilities and financials), and subsidiaries for which we do not have stock returns after listing.

Our account of how subsidiary listings are motivated by mispricing would make little sense if the owners of the newly listed subsidiary were also the owners of the parent. Subsidiary listings in Japan are new listings rather than spin-offs, so there is no mechanical reason why the shareholders of the parent and the nonparent owners of the subsidiary would be the same. To explore the potential overlap in ownership, we collect data on the largest owners of 55 randomly selected subsidiaries and their parents from the first postlisting ownership information captured in the *Japan Company Handbooks*. These books present information on the top 6 to 10 owners of both subsidiary and parent firms within a few months of subsidiary listings. On average, 1.1 of the listed parent owners appear on the list of subsidiary owners, which provides eight owners, on average. Entities that are listed as owners of parent equity own 3.1% of subsidiary equity on average, or 7.1% of the equity that is not owned by the parent. Our data do not allow us to

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<sup>9</sup>See "Subsidiaries in Japan," *Financial Times*, August 15, 2007.

<sup>10</sup>The 1987 handbook is the first handbook that provides information on firms listed on the second section of the TSE and on regional stock exchanges. One concern is that we may miss subsidiaries that are divested before we have the chance to observe a large blockholder. This does not appear to be much of a problem, however, since parent ownership tends to be stable over short time horizons. We also cross-checked our list with data from other sources: an analyst at Morgan Stanley and an analyst at a U.S. hedge fund independently provided us with lists of just over 300 firms that were still trading in late 2007 in which a parent controlled at least 50% of shares outstanding. Most of the extra firms on these lists were listed independently and later fell under the influence of a "parent" company and thus do not qualify under our methodology. We also scan the Securities Data Corporation (SDC) database for new issues in which the ultimate parent is different from the listed firm. In all, we added only 25 firms from these sources.

<sup>11</sup>La Porta et al. (1999) apply 20% to the number of votes controlled by the shareholder. Because dual-class shares are extremely rare in Japan, cash flow and voting rights are equivalent measures.

identify small shareholders in the subsidiary. However, when restricting our analysis to the larger shareholders, nearly all of the subsidiary equity sold by the parent is bought by investors who do not also own the parent.

The ownership information data from the *Japan Company Handbooks* allow us to select subsidiaries in which the parent maintains effective control yet owns a relatively small percentage of the cash flows. Specifically, we identify subsidiaries in which the parent's ownership stake after listing is between 20% and 50%. We also use the handbooks to determine whether the parent and subsidiary maintain a sales relationship. In most cases, the handbooks describe whether such a relationship exists. For example, NEC Fieldings' description reads "Ratio of sales to NEC group stands at around 70%." Jalux is a "JAL-affiliated trading company engaged in procurement of aircraft parts, sales of used aircraft and procurement of in-flight goods-for-sale for JAL group." Lawson Tickets "has outlets at Lawson stores nationwide." In a few cases we make subjective judgments about the nature and scope of these relationships.<sup>12</sup>

Data on market values and monthly stock returns are collected primarily from Datastream and augmented with data from the Japan Securities Research Institute (JSRI), the Pacific Basin Capital Markets (PACAP) Research Center, and Bloomberg, which are useful for listings in the 1980s, when Datastream coverage is sometimes sparse. Following other work on the postlisting performance of equity issues, such as that of Ritter (1991) and Brav and Gompers (1997), we compute returns for up to 36 months following listing. We measure these returns from the beginning of the month following listing because our data do not comprehensively cover returns beginning after the first day of trading.<sup>13</sup>

For many of our tests, we calculate risk-adjusted returns using the standard Fama and French (1993) risk factors: small minus big (*SMB*) is the value-weighted return of small stocks on the first section of the TSE minus the value-weighted return of large stocks; high minus low (*HML*) is the value-weighted return of large high book-to-market stocks minus the value-weighted return of large low book-to-market stocks, specifically, the Barra/Nikko Value return minus the Barra/Nikko Growth return.

Finally, our tests in Section V require daily returns around periods in which subsidiaries are repurchased. We use Factiva and Bloomberg to identify repurchase announcement dates and to collect daily returns for both parent and subsidiary firms around these announcements.

Our final database includes 431 subsidiaries listed by 243 unique parent companies. Of these, 164 list just one subsidiary, 39 list two subsidiaries, and 19 list three subsidiaries. One firm, Aeon, lists 13 subsidiaries.<sup>14</sup>

Table I provides some descriptive statistics on subsidiary listings in our sample. Subsidiaries are smaller than their parents: the median subsidiary's market equity at listing is about 7% of its parent's. For the typical listed subsidiary, the parent company retains just over 50% of subsidiary equity after listing. In 39% of subsidiary listings, the parent retains effective control but has a low cash flow stake because it owns 20% to 50% of the equity. A total of 42% of

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<sup>12</sup>For example, Nippon Steel Chemical is a chemical firm described as "Nippon Steel's strategic subsidiary, with development work done jointly," suggesting that it supplies chemicals and carries out R&D for its parent. Tokyo Kohtetsu is a producer of angle steel products; its parent, Mitsui, is a general trading company, with metals as its largest segment.

<sup>13</sup>For notational simplicity, we refer to the price recorded at the end of the listing month as the listing price, even though it falls a few days or weeks after the first trade.

<sup>14</sup>In untabulated tests, we obtain similar results when we exclude observations related to parents that list multiple subsidiaries. Thus, the results do not appear to reflect anything unique to the behavior of parent firms that list multiple subsidiaries.

**Table I. Characteristics of Subsidiary Listings**

This table presents descriptive statistics for the sample of 431 subsidiaries that listed in Japan between 1980 and 2005. Listing information is from the Toyo Keizai Japan Company Handbooks. A newly listed firm is considered to be a subsidiary if a publicly listed Japanese corporate parent owns at least 20% of the equity before and after listing. The sample excludes firms with multiple 20% blockholders at the time of listing, firms in regulated sectors (utilities and financials), and firms with missing monthly stock returns after listing. Market value of equity at listing is measured in billions of yen at the end of the listing month. Sales relationship subsidiaries are subsidiaries that have a sales relationship with their parent. Minority-owned subsidiaries are subsidiaries in which the parent owns more than 20% but less than 50% of the equity after listing. Reacquired by parent or related entity is a binary variable equal to one if the subsidiary is reacquired by its parent or a related entity following its listing.

	<b>N</b>	<b>Mean</b>	<b>Median</b>	<b>SD</b>	<b>Min</b>	<b>Max</b>
Initial stake	431	0.50	0.52	0.16	0.20	0.85
Market value of subsidiary equity at listing	431	66	17	447	1	9,000
Market value of parent equity at listing	431	757	294	1,370	3	14,639
Sales relationship subsidiaries	431	0.42	0.00	0.49	0.00	1.00
Minority-owned subsidiaries	431	0.39	0.00	0.49	0.00	1.00
Reacquired by parent or related entity	431	0.26	0.00	0.44	0.00	1.00

subsidiaries have a sales relationship with the parent firm.<sup>15</sup> It is noteworthy that subsidiaries have characteristics associated with limited arbitrage that could allow mispricing to be sustained: low market capitalization and limited float. D'Avolio (2002) shows that these characteristics are correlated with short sales constraints in U.S. data.

Throughout our analysis, we assume that the listings are not primarily motivated by financial constraints. Table II provides support for this assumption, detailing statistics on the financial constraints of the parent firms immediately before they list a subsidiary. The table presents means of firm characteristics that measure financial constraints, including measures of firm cash flow, the propensity to pay dividends and the amount of dividend payments, cash holdings, leverage, and Tobin's Q (Kaplan and Zingales, 1997; Almeida, Campello, and Weisbach, 2004). The first column presents statistics for parent firms in the year before listing a subsidiary. Parents appear to be financially healthy at this time: on average, they experience positive cash flows, more than 90% pay a dividend, their holdings of cash and marketable securities exceed 17% of their assets, and measures of book and market leverage are not very high.

For purposes of comparison, the second column of Table II presents statistics for these firms in other years. Parent firms do not appear to be more constrained in the year before listing a subsidiary than in other years. The only measure that differs across the two columns by a statistically significant amount is Tobin's Q. Parent firms appear to have a higher Tobin's Q in the year before listing a subsidiary. This may reflect parents having better investment opportunities, but it could also reflect parents timing the listing of subsidiaries to coincide with periods of high market valuations.

The third column of Table II presents statistics for firms other than parent firms that are covered in the PACAP database. These firms do exhibit some differences with parent firms in the year before listing a subsidiary, but the differences do not systematically suggest that parents are

<sup>15</sup>There is little overlap between the sets of minority-owned subsidiaries (the ones in which the parent owns 20–50% of the equity) and subsidiaries that have a sales relationship with the parent firm. The correlation between the two dummy variables is 0.06.

**Table II. Measures of Parent Firms' Financial Constraints**

This table compares the characteristics of parent firms in the year before listing with the characteristics of parents in other years and with the characteristics of other firms. The sample includes all firms in PACAP Japan during the 1980–2005 period. Cash flow is net income before extraordinary items plus depreciation. Dividend payer is a binary variable that is measured annually and is equal to one for firms that pay dividends. Dividends are cash dividends on common stock. Cash is cash plus marketable securities. Book leverage is the sum of short-term loans, long-term loans, and debentures, divided by total debt plus the book value of stockholders' equity. Market leverage is defined similarly except that the market value of stockholders' equity is used. Tobin's Q is the market value of common stock plus book assets and minus book equity, divided by book assets. Standard errors are adjusted for clustering by firm.

	Parents in Year Before Listing Subsidiary	Parents in Other Years	Other Firms
Cash flow/assets	0.0337	0.0339	0.0374
Dividend payer	0.9060	0.8903	0.8394***
Dividends/assets	0.0073	0.0073	0.0070
Cash/assets	0.1740	0.1815	0.1854
Book leverage	0.4694	0.4567	0.4014***
Market leverage	0.3319	0.3395	0.3069
Tobin's Q	1.6207	1.4953***	1.4331***

\*\*\*Significant at the 0.01 level.

financially constrained. Other firms are less likely to pay a dividend than parent firms are in the year before they list a subsidiary. They have lower book leverage but similar market leverage. Other firms also have lower Tobin's Q than parent firms immediately before listing a subsidiary.

## IV. Valuations and Stock Market Performance of Listed Subsidiaries

### A. Market Valuations and Market-to-Book Ratios

Figure 1 shows the number of subsidiary listings by year. The lightly shaded line illustrates the value of the TOPIX stock return index at the start of the year, measured on the left axis. The darker line illustrates the number of subsidiary listings, measured on the right axis. Subsidiary listings closely track the market, with the number of listings increasing following good stock market performance. Although we focus primarily on forecasting the abnormal performance of subsidiary listings, the figure also shows that when the number of subsidiary listings is high, subsequent market performance is low.<sup>16</sup>

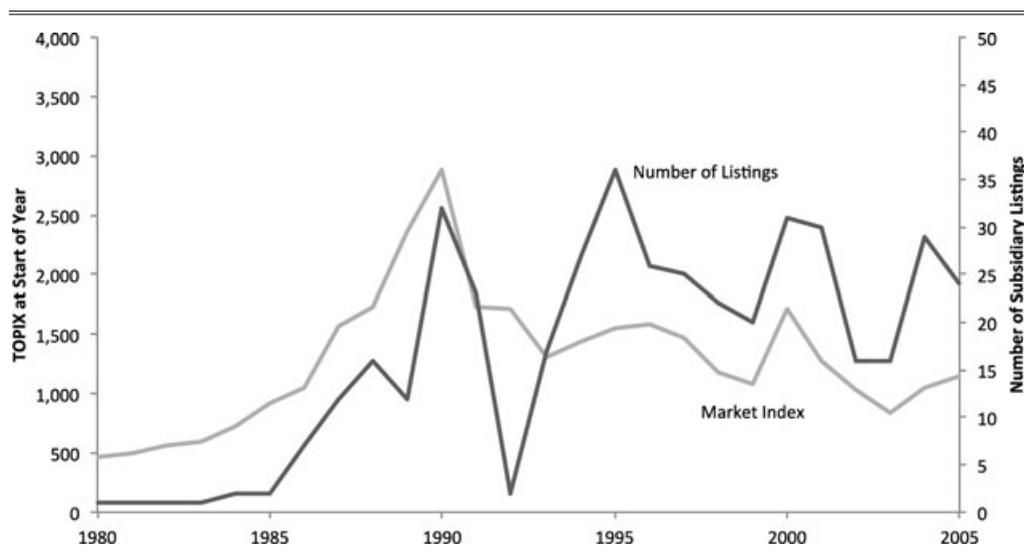
Table III reports market-to-book ratios at the industry and firm level in the listing year. The market-to-book ratio has been used by a variety of corporate finance studies as a measure of overvaluation because of its well-known correlation with subsequent stock returns.<sup>17</sup> However,

<sup>16</sup>This can also be verified by estimating a forecasting regression of stock market excess returns in year  $t + 1$  on the log of one plus the number of listings in year  $t$ . This yields a coefficient of 8.08 and a  $t$ -statistic of 2.60. We do not emphasize these results here because of the small number of observations. The correlation between equity listings and market-level stock returns is reminiscent of Baker and Wurgler (2000).

<sup>17</sup>Baker and Wurgler (2002) and Rhodes-Kropf, Robinson, and Viswanathan (2005) use this measure as an ex ante valuation measure, and Fama and French (1992) and Daniel and Titman (1997) show that it predicts future returns.

**Figure 1. Market Valuations and Subsidiary Listings**

This figure shows the value of the TOPIX stock exchange index at the beginning of the year and the number of subsidiary listings during the year. A newly listed firm is considered to be a subsidiary if a publicly listed Japanese corporate parent owns at least 20% of the equity before and after listing. Listing information is from the Toyo Keizai Japan Company Handbooks.

**Table III. Market-to-Book of New Listings**

This table reports market-to-book ratios for subsidiary industries as well as for subsidiaries and parents in the listing year. The sample consists of 431 subsidiary and 1,825 nonsubsidiary listings during the 1980–2005 period. The top panel presents equal-weighted averages of the industry market-to-book ratio, as measured at the end of the listing year, for all listings, nonsubsidiary listings, and subsidiary listings. To compute these ratios, we first calculate equal-weighted averages of market-to-book ratios of all publicly traded firms in a given industry. The bottom panel shows equal-weighted averages of subsidiary market-to-book ratios and parent market-to-book ratios in the year of subsidiary listing.

<i>Panel A. Industry Market-to-Book</i>	
All listings	2.47
Nonsubsidiary listings	2.41
Subsidiary listings	2.73
<i>Panel B. Subsidiary and Parent Market-To-Book</i>	
Subsidiary	3.38
Parent	2.34

the market-to-book ratio is contaminated by growth opportunities, so evidence based on it must be interpreted with caution.

Panel A of Table III presents mean industry market-to-book ratios for subsidiary listings and nonsubsidiary listings. For the full sample of subsidiary and nonsubsidiary listings, the mean industry market-to-book ratio is 2.47 in the year of listing. However, the subsidiary listings'

average industry market-to-book ratio of 2.73 is significantly higher than the nonsubsidiary listings' industry market-to-book ratio of 2.41. Thus, subsidiaries tend to list at times when industry valuations are high, even relative to nonsubsidiary listings.

Panel B of Table III presents mean subsidiary and parent market-to-book ratios in the year of subsidiary listing. At listing, the mean subsidiary market-to-book ratio is 3.38, while the mean parent market-to-book ratio is 2.34. This pattern implies that managers tend to list subsidiaries at times when they are valued at levels that are high relative to parent valuations. If market-to-book ratios are interpreted as reflecting market overvaluation, this pattern is consistent with the findings of Nanda (1991), Slovin and Sushka (1995, 1997), and Schill and Zhou (2001) who suggest that mispricing differences between the subsidiary and the parent motivate the choice to list the subsidiary rather than to issue more parent shares.

An interesting question is the question of how the market price of parent equity responds to the announcement of a subsidiary listing? At least three forces may be at play. First, if market participants believe that parent shareholders benefit from listing overpriced equity in a subsidiary, then the parent stock price should rise. Second, if the parent and subsidiary are similar, perhaps because they operate in the same industry, and market participants view a listing as a signal that the future prospects of a line of business are poor, then the announcement of a subsidiary listing could cause the parent stock price to fall. Third, following Nanda (1991), a parent choosing to sell subsidiary equity instead of its own equity could be interpreted as a sign that the parent is undervalued relative to the subsidiary, in which case the parent stock price should rise when a subsidiary is listed. In summary, the theoretical predictions are ambiguous. In addition, identifying the precise announcement dates of subsidiary listings is difficult.<sup>18</sup> Notwithstanding in untabulated tests, we find that parents experience positive abnormal returns, but there appears to be significant information leakage in the days prior to the measured announcement date.<sup>19</sup> Overall, these results are consistent with the first and third effects listed above, but they do not rule out the existence of the second.

## B. Subsidiary Underperformance

Figure 2 and Table IV summarize cumulative monthly returns earned by subsidiary and nonsubsidiary listings over the first 36 months following the initial public offering (IPO). We track monthly returns starting at the end of the listing month. The dashed line in Figure 2 shows returns to nonsubsidiary listings. Their cumulative returns hover around zero; 36 months after listing cumulative returns are just over 3%. By comparison, cumulative returns of subsidiaries are negative. Table IV summarizes the returns shown in Figure 2. The first two panels show results for the full sample, with Panel A showing raw returns and Panel B showing industry-adjusted returns. Both raw and industry-adjusted returns earned by subsidiaries are negative, with industry-adjusted returns of  $-6.33\%$ ,  $-13.36\%$ , and  $-13.91\%$  over the one-, two-, and three-year horizons after listing.<sup>20</sup>

Table IV also shows parent returns, both raw returns and returns adjusted for the performance of the parent's stake in the subsidiary. If investors do not fully anticipate the potential costs

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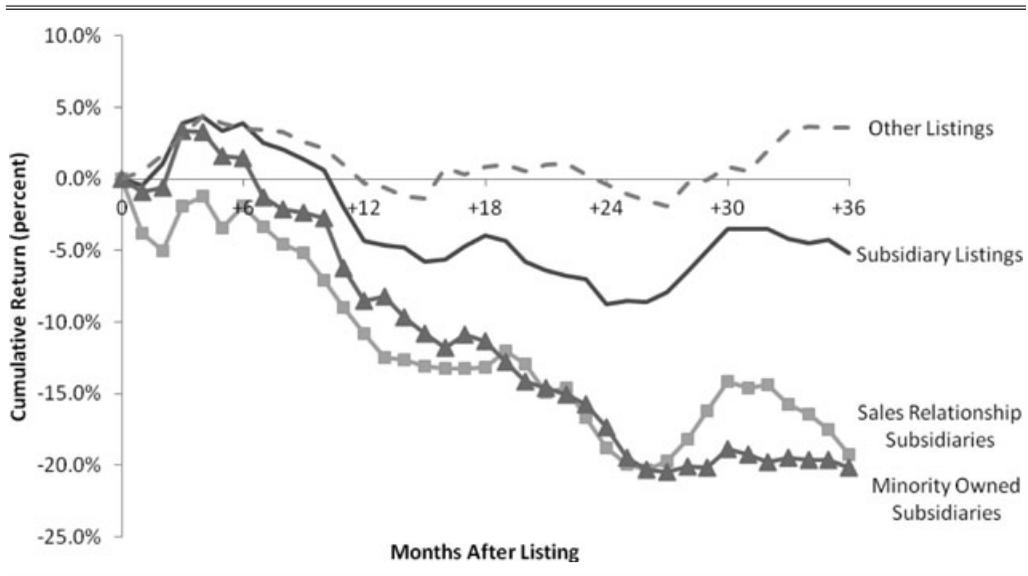
<sup>18</sup>Announcement dates in the SDC database refer to the filing date of the prospectus, which can be long after the parent announced its intention to list the subsidiary. For example, in the case of NECE, the initial announcement was made more than a year before the prospectus was filed.

<sup>19</sup>Abnormal returns for the parent firm in the  $[-5,+5]$  window around announcement are  $2.2\%$  ( $t$ -statistic of 4.3), based on a sample of 304 events for which we could identify announcement dates.

<sup>20</sup>Because we find both raw and industry-adjusted underperformance, this suggests that levels of mispricing are not common across all firms in the market or all firms in an industry.

**Figure 2. Cumulative Monthly Returns to Publicly Listed Subsidiaries and Other Listings**

This figure shows the cumulative market returns of subsidiary listings, nonsubsidiary listings, and two subsets of subsidiary listings, specifically those that are minority owned and those which have a sales relationship with their parent. Minority owned subsidiaries are subsidiaries in which the parent owns more than 20% but less than 50% of the equity after listing.



of expropriation from the subsidiary's perspective, it seems equally likely that they ignore the benefits of expropriation from the perspective of the parent. Thus subsidiary underperformance in the stock market may be accompanied by parent outperformance. When studying parent returns, we remove the mechanical effect of the parent's stake in the subsidiary: if a parent owns share  $1 - \alpha$  of a subsidiary, we isolate the returns to investing in parent assets by hedging out the parent's implied position in the subsidiary:

$$r_{it}^{PA} = r_{it}^{Parent} - (1 - \alpha) \left( \frac{MV^{Sub}}{MV^{Parent}} \right) r_{it}^{Sub}. \quad (1)$$

The third column of Panel B shows that adjusted parent returns, after industry adjustment, are positive but small, providing weak evidence that parent returns outperform.<sup>21</sup> These patterns are also consistent with the view that parents choose to issue subsidiary equity when it is overvalued relative to parent equity.

Because expropriation of minority shareholders constitutes a transfer of resources from subsidiary to parent, we have the most power to detect it by looking at the difference between parent and subsidiary returns. These values are reported in the last two columns of Table IV and are

<sup>21</sup>When analyzing cumulative returns, as in Table IV, we measure the parent's stake after listing and the market values of parent and subsidiary equity at the end of the listing month. When analyzing monthly returns, as in Tables V and VI, we measure the parent's stake and the market values of parent and subsidiary equity as of the end of the previous month.

**Table IV. Cumulative Returns Following Subsidiary Listing**

This table reports cumulative monthly returns over 1-, 2-, and 3-year horizons following listing for all subsidiaries and for two subsets of subsidiaries. Adjusted parent returns capture the return on parent company equity adjusted for the return on parent's stake in the subsidiary. Adjusted parent returns are equal to

$$r_{it}^{PA} = r_{it}^{Parent} - (1 - \alpha) \left( \frac{MV^{Sub}}{MV^{Parent}} \right) r_{it}^{Sub},$$

where the parent's stake in subsidiary,  $1 - \alpha$ , and market values of parent,  $MV^{Parent}$ , and subsidiary equity,  $MV^{Sub}$ , are measured at the end of the listing month. Industry-adjusted returns are net of matched industry returns. Minority-owned subsidiaries are subsidiaries in which the parent owns more than 20% but less than 50% of the equity after listing. Sales relationship subsidiaries are subsidiaries that have a sales relationship with their parent. Robust  $t$ -statistics are reported in parentheses.

	<b>Subsidiary</b>	<b>Parent</b>	<b>Adjusted Parent</b>	<b>Parent-Subsidiary</b>	<b>Adjusted Parent-Subsidiary</b>
<i>Panel A: Full Sample (N = 431)</i>					
1 year	-4.30 (-1.51)	1.47 (0.82)	3.16 (1.80)	5.77** (2.13)	7.46** (2.50)
2 years	-8.74 (-2.35)	2.64 (1.01)	5.61 (2.23)	11.38*** (3.35)	14.35*** (3.75)
3 years	-5.18 (-1.20)	7.47 (2.46)	10.23 (3.52)	12.65*** (3.21)	15.42*** (3.48)
<i>Panel B: Full Sample Industry-Adjusted (N = 431)</i>					
1 year	-6.33 (-2.37)	-0.13 (-0.09)	1.55 (0.99)	6.20** (2.19)	7.89** (2.56)
2 years	-13.36 (-3.79)	-1.15 (-0.53)	1.82 (0.85)	12.21*** (3.52)	15.18*** (3.92)
3 years	-13.91 (-3.36)	0.07 (0.03)	2.84 (1.14)	13.99*** (3.49)	16.75*** (3.76)
<i>Panel C: Minority-Owned Subsidiaries (N = 168)</i>					
1 year	-8.51 (-1.99)	2.75 (0.99)	5.00 (1.80)	11.26** (2.52)	13.51*** (2.78)
2 years	-17.36 (-3.15)	-1.99 (-0.50)	2.17 (0.56)	15.37*** (2.98)	19.52*** (3.36)
3 years	-20.19 (-3.01)	3.36 (0.69)	7.49 (1.61)	23.55*** (4.18)	27.68*** (4.33)
<i>Panel D: Sales Relationship Subsidiaries (N = 179)</i>					
1 year	-10.77 (-2.65)	-1.07 (-0.39)	1.86 (0.68)	9.70** (2.60)	12.64*** (3.04)
2 years	-18.78 (-3.44)	0.90 (0.22)	5.20 (1.34)	19.68*** (4.02)	23.98*** (4.25)
3 years	-19.24 (-2.93)	1.77 (0.38)	6.48 (1.50)	21.01*** (3.55)	25.72*** (3.73)

\*\*\* Significant at the 0.01 level.

\*\* Significant at the 0.05 level.

quite large. When measured using adjusted parent returns, they are around 7% to 8% over the first year and around 15%–17% over the three-year period after listing.

We then turn to minority-owned subsidiaries. Figure 2 and Panel C of Table IV show that minority-owned subsidiaries perform much worse than the full sample of subsidiaries and other new listings. Over the first three years after listing, these subsidiaries earn cumulative raw returns of –20.19%. This underperformance is consistent with the idea that higher mispricing encourages parent firms to list a larger fraction of the subsidiary's equity, in spite of the agency costs that listing introduces.

Finally, we isolate a group of subsidiaries for which the ex ante scope for expropriation by the parent firm is high. Figure 2 and Panel D of Table IV show that subsidiaries that maintain a sales relationship with the parent firm earn cumulative raw returns of –19.24% in the first three years after listing.<sup>22</sup>

Both Figure 2 and Table IV indicate that subsidiary stock market underperformance occurs primarily over the first two years following listing. Cumulative returns over the three-year horizon are only slightly lower than those over the two-year horizon.

### C. Risk-Adjusted Returns

While event-time returns provide the flavor of our results, they are subject to a number of critiques. First, most of the returns that we report in Figure 2 and Table IV are not adjusted for risk.<sup>23</sup> Second, it is difficult to determine the statistical significance of cumulative returns. As shown by Mitchell and Stafford (2000), conventional event-time approaches produce test statistics that are too large because multiyear abnormal returns are falsely assumed to be independent.<sup>24</sup> We address these issues by calculating calendar-time risk-adjusted returns.

Table V presents the results of a panel analysis of monthly subsidiary and adjusted parent stock returns:

$$r_{it} = \alpha + \beta_1 \cdot RMRF_t + \beta_2 \cdot HML_t + \beta_3 \cdot SMB_t + \varepsilon_{it}, \quad (2)$$

where  $r_{it}$  is the subsidiary or adjusted parent monthly return, net of the risk-free rate, or, alternately, the adjusted parent return minus the subsidiary return. The specifications include the standard Fama and French (1993) risk factors: the market excess return,  $RMRF_t$ ; the value-weighted return of small stocks minus the value-weighted return of large stocks,  $SMB_t$ ; and the value-weighted return of high book-to-market stocks minus the value-weighted return of low book-to-market stocks,  $HML_t$ . The constant term  $\alpha$  in Equation (2) denotes the risk-adjusted abnormal performance. Standard errors are adjusted to allow for clustering by month. Our procedure will pick up mispricing only if it has a component that is not common across all firms. Our approach is consistent with the literature on the stock market performance of new issues, which demonstrates that newly listed firms underperform, even after controlling for the market and exposure to  $HML$  and  $SMB$  (e.g., Loughran and Ritter, 1995).

<sup>22</sup>Ball, Chiu, and Smith (2011) draw a distinction between listing motivations related to market timing and pseudo-market timing. The large negative returns earned by certain types of subsidiaries following their listing suggest that parents engage in market timing rather than pseudo-market timing.

<sup>23</sup>For example, newly listed subsidiaries have high market-to-book ratios, and their underperformance could reflect poor returns earned by high market-to-book firms more generally.

<sup>24</sup>See also Brav and Gompers (1997), Lyon, Barber, and Tsai (1999), Brav (2000), and Hanson (2008) for discussions of statistical inference in long-horizon event studies.

**Table V. Risk-Adjusted Returns**

This table reports monthly risk-adjusted returns for the full sample of subsidiaries and for two subsets of subsidiaries. Monthly risk-adjusted returns are calculated using the following panel regression

$$r_{it} = \alpha + \beta_1 \cdot RMR_{Ft} + \beta_2 \cdot HML_t + \beta_3 \cdot SMB_t + \varepsilon_{it},$$

where  $r_{it}$  is subsidiary or adjusted parent return, net of the risk free rate, or alternately, is the adjusted parent return minus subsidiary return. Adjusted parent returns capture the return on parent company equity adjusted for the return on parent's stake in subsidiary. Adjusted parent returns are equal to

$$r_{it}^{PA} = r_{it}^{Parent} - (1 - \alpha_{i,t-1}) \left( \frac{MV_{i,t-1}^{Sub}}{MV_{i,t-1}^{Parent}} \right) r_{it}^{Sub},$$

where  $1 - \alpha_{i,t-1}$  is parent's stake in subsidiary at time  $t - 1$ .  $RMRF$  is the Topix return net of the risk-free rate.  $HML$  is the Barra/Nikko Value return minus the Barra/Nikko Growth return.  $SMB$  is the value-weighted return of small stocks on the first section of the Tokyo Stock Exchange minus the value-weighted return of large stocks.  $N$  is the average number of subsidiaries in each monthly cross section. Minority-owned subsidiaries are subsidiaries in which the parent owns more than 20% but less than 50% of the equity after listing. Sales relationship subsidiaries are subsidiaries that have a sales relationship with their parent.  $t$ -statistics, reported in parentheses below the coefficients, are adjusted for clustering by month.

Holding Period	Return	$\alpha$	$RMRF$	$HML$	$SMB$	$N$	Adjusted $R^2$
<i>Panel A. Full Sample</i>							
1 year	Subsidiary –	-0.40	0.77***	-0.56***	0.81***	426	0.12
	Risk Free	(-0.89)	(9.50)	(-2.89)	(7.67)		
	Adjusted Parent –	0.14	1.04***	-0.10	0.41***	426	0.28
	Risk Free	(0.77)	(26.94)	(-1.13)	(6.79)		
2 years	Adjusted Parent –	0.54	0.28***	0.47**	-0.40***	426	0.01
	Subsidiary	(1.16)	(3.54)	(2.36)	(-3.54)		
	Subsidiary –	-0.33	0.82***	-0.44***	0.78***	423	0.13
	Risk Free	(-0.95)	(12.82)	(-3.00)	(8.89)		
3 years	Adjusted Parent –	0.14	1.04***	0.03	0.33***	423	0.24
	Risk Free	(0.81)	(30.58)	(0.35)	(6.21)		
	Adjusted Parent –	0.47	0.22***	0.47***	-0.44***	423	0.01
	Subsidiary	(1.36)	(3.63)	(3.20)	(-4.80)		
3 years	Subsidiary –	-0.15	0.82***	-0.39***	0.77***	416	0.14
	Risk Free	(-0.49)	(14.51)	(-3.16)	(9.95)		
	Adjusted Parent –	0.17	1.02***	0.05	0.37***	416	0.24
	Risk Free	(1.15)	(36.24)	(0.81)	(7.87)		
3 years	Adjusted Parent –	0.32	0.20***	0.44***	-0.40***	416	0.01
	Subsidiary	(1.02)	(3.51)	(3.35)	(-4.48)		

(Continued)

**Table V. Risk-Adjusted Returns (Continued)**

Holding Period	Return	$\alpha$	<i>RMRF</i>	<i>HML</i>	<i>SMB</i>	<i>N</i>	Adjusted $R^2$
<i>Panel B. Minority-Owned Subsidiaries</i>							
1 year	Subsidiary – Risk Free	–0.73 (–1.56)	0.68*** (9.04)	–0.62*** (–2.61)	0.76*** (7.15)	166	0.12
	Adjusted Parent – Risk Free	0.32 (1.42)	0.97*** (22.29)	–0.17 (–1.50)	0.53*** (8.00)	166	0.30
2 years	Adjusted Parent – Subsidiary	1.06** (2.08)	0.30*** (3.73)	0.46* (1.82)	–0.23** (–1.98)	166	0.01
	Subsidiary – Risk Free	–0.60* (–1.68)	0.74*** (10.77)	–0.40** (–2.27)	0.71*** (8.14)	165	0.13
	Adjusted Parent – Risk Free	0.05 (0.27)	0.97*** (25.90)	0.07 (0.82)	0.44*** (7.66)	165	0.25
	Adjusted Parent – Subsidiary	0.65* (1.72)	0.23*** (3.25)	0.47*** (2.60)	–0.28*** (–2.85)	165	0.01
3 years	Subsidiary – Risk Free	–0.51* (–1.71)	0.73*** (13.68)	–0.34** (–2.41)	0.69*** (9.76)	164	0.12
	Adjusted Parent – Risk Free	0.14 (0.82)	0.96*** (30.23)	0.13* (1.94)	0.46*** (8.51)	164	0.25
	Adjusted Parent – Subsidiary	0.65* (1.97)	0.24*** (4.13)	0.47*** (3.00)	–0.23*** (–2.61)	164	0.01
	<i>Panel C. Sales Relationship Subsidiaries</i>						
1 year	Subsidiary – Risk Free	–0.98** (–2.14)	0.80*** (7.83)	–0.49*** (–2.73)	0.87*** (7.25)	177	0.16
	Adjusted Parent – Risk Free	0.03 (0.11)	1.05*** (21.15)	–0.26** (–2.35)	0.36*** (4.27)	177	0.30
	Adjusted Parent – Subsidiary	1.01** (2.20)	0.26*** (3.08)	0.23 (1.29)	–0.51*** (–4.16)	177	0.02
	2 years	Subsidiary – Risk Free	–0.71** (–2.00)	0.81*** (10.46)	–0.43*** (–2.91)	0.83*** (9.08)	176
Adjusted Parent – Risk Free		0.14 (0.65)	1.03*** (24.37)	–0.08 (–0.87)	0.25*** (3.50)	176	0.23
Adjusted Parent – Subsidiary		0.86** (2.35)	0.22*** (3.23)	0.35** (2.28)	–0.58*** (–5.58)	176	0.02
3 years		Subsidiary – Risk Free	–0.50 (–1.61)	0.81*** (12.10)	–0.32** (–2.57)	0.81*** (9.61)	174
	Adjusted Parent – Risk Free	0.17 (0.87)	1.01*** (28.90)	–0.05 (–0.68)	0.28*** (4.69)	174	0.23
	Adjusted Parent – Subsidiary	0.67** (2.01)	0.20*** (2.96)	0.27** (2.05)	–0.52*** (–5.25)	174	0.02

\*\*\*Significant at the 0.01 level.

\*\*Significant at the 0.05 level.

\*Significant at the 0.10 level.

Our panel specification in Equation (2) differs slightly from a calendar-time approach that collapses events into a single time series of average returns in each period. This kind of calendar-time approach weights each time period equally, and, if firms respond to time-varying mispricing, it produces biased test statistics that have low power. To obtain unbiased test statistics, Loughran and Ritter (2000) advocate weighting each period by the number of observations in that period. It is straightforward to show that our panel specification is equivalent to their weighting scheme. Our panel approach also addresses the common critique that event-study returns overstate statistical significance due to overlapping return measurement. Furthermore, the panel specification allows for arbitrary correlation structure and can be generalized to compare the returns of subsidiaries and other listings.

Panel A of Table V shows estimates from Equation (2) based on the full sample of subsidiaries. Over the two-year horizon following listing, subsidiary abnormal returns are  $-33$  basis points per month, and adjusted parent abnormal returns are 14 basis points per month. Thus, a portfolio that is long adjusted parent returns and short subsidiary returns earns 47 basis points per month. Although economically large, these returns are not statistically distinguishable from zero. Similar results are obtained over one- and three-year horizons, although the portfolio described above earns slightly higher average returns over a one-year horizon and slightly lower average returns over a three-year horizon. Not surprisingly, Table V shows that subsidiary returns have a negative factor loading on *HML* and a positive factor loading on *SMB*, reflecting their high market-to-book ratios and small size at the time of listing. Adjusted parent returns have a smaller exposure to *SMB* and higher exposure to the market than subsidiary returns and an insignificant loading on *HML*.

Panel B of Table V analyzes the subsample of minority-owned subsidiaries. Over the two-year horizon after listing, these subsidiaries earn abnormal returns of  $-60$  basis points per month, and these returns are statistically significant at the 10% level. There are correspondingly positive abnormal returns to the portfolio that is long adjusted parent returns and is short subsidiary returns.

Panel C of Table V analyzes the subsample of subsidiaries that maintain a sales relationship with the parent. Over the two-year horizon after listing, these subsidiaries earn statistically significant abnormal returns of  $-71$  basis points per month. Adjusted parent returns exceed subsidiary returns by 86 basis points per month over this horizon. We get similar results at one- and three-year horizons. At each horizon, subsidiaries earn negative abnormal returns and there are positive abnormal returns to the portfolio that buys adjusted parent returns and is short subsidiary returns.<sup>25</sup>

Overall, the results in Tables IV and V support our hypotheses that listings in which the parent owns a small share of the equity after listing and listings for which there is greater scope for agency problems require significant overvaluation to support the listing. In particular, our two-year horizon estimates in Panel C of Table V suggest that subsidiaries that maintain a sales relationship with their parent are approximately  $24 \times 0.71 \approx 17\%$  overvalued at the time of listing.<sup>26</sup>

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<sup>25</sup>We obtain different results if we analyze the subsample of subsidiaries that are in the same industry as their parents. Such subsidiaries have risk-adjusted returns that are similar to the full-sample results. This can be interpreted as being consistent with the view that sales relationships create opportunities for expropriation, but that such opportunities are limited when parents and subsidiaries are in the same industry.

<sup>26</sup>One potential concern about our results is that they are driven by subsidiaries that list around the peak of the Japanese stock market. This does not appear to be the case. We obtain similar results when we, for example, exclude the 1988–1992 period around the peak or when we split the sample into two halves, 1980–1992 versus 1993–2005.

Ritter (1991), Loughran and Ritter (1995) and others document the underperformance of IPOs in the United States. The poor performance of newly listed subsidiaries could be symptomatic of a more general new listing effect, although the more pronounced underperformance of subsidiaries with a sales relationship would not follow immediately from a general listing effect. The returns for nonsubsidiary listings in Figure 2 suggest that nonsubsidiary listings have not performed as poorly as subsidiary listings. To test this more formally, we pool our subsidiary listings with nonsubsidiary listings into a single panel. We then estimate whether subsidiaries have statistically distinguishable underperformance relative to this control group. Table VI shows the results of regressions of the form

$$r_{it} = \alpha + \alpha_{Sub} \cdot Subsidiary_i + \beta_1 \cdot RMRF_t + \beta_2 \cdot Subsidiary_i \cdot RMRF_t + \beta_3 \cdot HML_t + \beta_4 \cdot Subsidiary_i \cdot HML_t + \beta_5 \cdot SMB_t + \beta_6 \cdot Subsidiary_i \cdot SMB_t + \varepsilon_{it}, \quad (3)$$

where  $r_{it}$  is the return on new listings, net of the risk-free rate, and *Subsidiary* is a dummy variable indicating subsidiary listings. This specification allows subsidiary and nonsubsidiary listings to have different factor loadings.<sup>27</sup> The constant term coefficient  $\alpha$  is the realized average abnormal return of nonsubsidiary listings, and the coefficient on the *Subsidiary* dummy,  $\alpha_{Sub}$ , measures the underperformance of subsidiaries relative to the other listings control group.

Panel A of Table VI shows results for the full sample, which now includes subsidiary and other listings. Nonsubsidiary listings earn small and statistically insignificant abnormal returns over one-, two-, and three-year horizons. The coefficient on the subsidiary dummy implies that subsidiaries underperform other listings by 19–28 basis points per month over the first three years after listing, but these coefficients are not statistically significant.

Panels B and C of Table VI report results for minority-owned subsidiaries and subsidiaries that maintain a sales relationship with their parent. These subsidiaries underperform other new listings by 52 to 87 basis points per month, depending on the horizon, with the differences in returns being statistically significant at conventional levels. Thus, the performance of subsidiaries that are subject to agency problems does not appear to reflect a general new listing effect.

The existing literature emphasizes financial constraints as a motivation for listing equity in the presence of agency problems. It is difficult to imagine how considerations related to financial constraints could drive the results on returns, and the descriptive statistics in Table II suggest that parents are not financially constrained at the time subsidiaries are listed. Notwithstanding, we analyzed returns for subsets of our data in which the listing parent appears more financially constrained.<sup>28</sup> In such cases, the risk-adjusted returns of subsidiaries and portfolios that are long adjusted parent returns and short subsidiary returns are indistinguishable from zero. Interestingly, one situation in which subsidiaries do perform poorly is when parent firms hold high levels of cash at the end of the year prior to listing the subsidiary (not tabulated), suggesting that mispricing is a more salient motivation for listing when financial constraints seem particularly unlikely.

<sup>27</sup>With the exception of the large subsidiaries' loading on *SMB*, subsidiary and other listings have very similar factor loadings, which we do not report here to preserve space. We obtain similar results when we assume that subsidiary and nonsubsidiary listings have the same factor loadings.

<sup>28</sup>Specifically, we assume that the listing parent is most likely to be financially constrained when the parent has a low ratio of cash flow to assets, a low ratio of dividends to assets, a low ratio of cash to assets, high book leverage, high market leverage, or a high Tobin's Q. For each measure of financial constraints, "low" ("high") corresponds to the bottom (top) third of observations for parent firms in the year prior to listing.

**Table VI. Risk-Adjusted Returns of Subsidiary versus Nonsubsidiary Listings**

This table reports monthly risk-adjusted returns of subsidiary and nonsubsidiary listings. Monthly risk-adjusted returns are calculated using the following panel regression

$$r_{it} = \alpha + \alpha_{sub} \cdot Subsidiary + \beta_1 \cdot RMRF_t + \beta_2 \cdot Subsidiary \cdot RMRF_t + \beta_3 \cdot HML_t + \beta_4 \cdot Subsidiary \cdot HML_t + \beta_5 \cdot SMB_t + \beta_6 \cdot Subsidiary \cdot SMB_t + \varepsilon_{it}$$

The full sample consists of all listings during the 1980–2005 period. The samples in panels B and C consist of all nonsubsidiary listings and one of two subsets of subsidiary listings. *Subsidiary* is a binary variable equal to one for subsidiary listings. *RMRF* is the Topix return net of the risk-free rate. *HML* is the Barra/Nikko Value return minus the Barra/Nikko Growth return. *SMB* is the value-weighted return of small stocks on the first section of the Tokyo Stock Exchange minus the value-weighted return of large stocks. *N* is the average number of firms in each monthly cross section. Minority-owned subsidiaries are subsidiaries in which the parent owns more than 20% but less than 50% of the equity after listing. Sales relationship subsidiaries are subsidiaries that have a sales relationship with their parent. *t*-statistics, reported in parentheses below the coefficients, are adjusted for clustering by month.

Holding Period	$\alpha_{sub}$	$\alpha$	<i>RMRF</i>	<i>RMRF</i> × <i>Sub</i>	<i>HML</i>	<i>HML</i> × <i>Sub</i>	<i>SMB</i>	<i>SMB</i> × <i>Sub</i>	<i>N</i>	Adjusted <i>R</i> <sup>2</sup>
<i>Panel A. Full Sample</i>										
1 year	-0.28 (-1.00)	-0.11 (-0.22)	0.78*** (8.48)	-0.01 (-0.17)	-0.57*** (-2.69)	0.01 (0.09)	0.80*** (6.01)	0.01 (0.10)	1,865	0.09
2 years	-0.25 (-1.09)	-0.08 (-0.18)	0.83*** (9.98)	-0.01 (-0.21)	-0.46*** (-2.73)	0.02 (0.23)	0.80*** (6.83)	-0.02 (-0.34)	1,883	0.09
3 years	-0.19 (-1.01)	0.04 (0.10)	0.89*** (11.74)	-0.06 (-1.63)	-0.41*** (-2.81)	0.02 (0.31)	0.79*** (7.43)	-0.02 (-0.38)	1,871	0.10
<i>Panel B. Minority-Owned Subsidiaries</i>										
1 year	-0.62 (-1.53)	-0.11 (-0.22)	0.78*** (8.48)	-0.10 (-1.36)	-0.57*** (-2.69)	-0.05 (-0.35)	0.80*** (6.01)	-0.04 (-0.38)	1,605	0.08
2 years	-0.52* (-1.67)	-0.08 (-0.18)	0.83*** (9.98)	-0.09 (-1.48)	-0.46*** (-2.73)	0.06 (0.49)	0.80*** (6.83)	-0.08 (-1.03)	1,626	0.09
3 years	-0.55** (-2.00)	0.04 (0.10)	0.89*** (11.74)	-0.16*** (-2.88)	-0.41*** (-2.81)	0.07 (0.67)	0.79*** (7.43)	-0.10 (-1.38)	1,619	0.10
<i>Panel C. Sales Relationship Subsidiaries</i>										
1 year	-0.87** (-2.16)	-0.11 (-0.22)	0.78*** (8.48)	0.02 (0.22)	-0.57*** (-2.69)	0.08 (0.55)	0.80*** (6.01)	0.07 (0.72)	1,616	0.09
2 years	-0.63** (-1.99)	-0.08 (-0.18)	0.83*** (9.98)	-0.02 (-0.40)	-0.46*** (-2.73)	0.03 (0.30)	0.80*** (6.83)	0.03 (0.39)	1,637	0.09
3 years	-0.54** (-2.01)	0.04 (0.10)	0.89*** (11.74)	-0.08 (-1.57)	-0.41*** (-2.80)	0.09 (1.02)	0.79*** (7.43)	0.01 (0.16)	1,629	0.10

\*\*\*Significant at the 0.01 level.  
 \*\*Significant at the 0.05 level.  
 \*Significant at the 0.10 level.

## V. Subsidiary Ownership Changes After Listing

Figure 2 and Table IV indicate that the underperformance of subsidiaries with the most severe agency problems lasts two or three years, suggesting that mispricing corrects over this horizon. When valuations return to fundamental levels or overshoot, parent firms have an incentive to repurchase their subsidiaries. If a parent repurchases all of the equity of a subsidiary, it is likely to terminate activities that generate agency costs, such as actions taken to disguise transfer pricing.

### Table VII. Subsidiary Outcomes

This table reports information about how parent ownership of subsidiaries changes from the time subsidiaries list until their last appearance in the data.

Total number of subsidiaries observed	431
Parent stake within 5% of listing stake	147
Parent increases stake by at least 5% but does not buy back subsidiary	26
Parent buys back subsidiary	109
Parent decreases stake by at least 5% but does not sell entire stake	85
of which maintain at least 20%	63
of which maintain at least 50%	36
Parent sells entire stake	64

The gains from eliminating these agency costs may be captured by parent firms because minority shareholders have few powers to object to the terms of a repurchase. Squeeze-out laws and delisting rules yield considerable negotiating power to the parent firm, enabling them to capture some of the gains associated with repurchases.<sup>29</sup> If the reacquisitions are not fully anticipated by the market, they should be associated with positive announcement returns to the parent firm.

#### A. Ownership Changes After Listing

We use the *Japan Company Handbooks* through 2007 to track the ownership of each subsidiary after listing. These outcomes are summarized in Table VII. The most common outcome is that parents maintain approximately the same ownership share they held at listing. Specifically, in 147 cases, parent ownership is within five percentage points of the stake held right after the subsidiary was listed.

The next most common outcome is that the parent repurchases all of the subsidiary's public shares. This happens in 109 cases, which is about a quarter of our sample. The number of subsidiaries that are repurchased is considerably higher than the number of subsidiaries that are divested by the parent. In only 64 cases does the parent firm sell its entire stake. Parents decrease their ownership by five percentage points or more without selling their entire stake in 85 cases; in 63 of these they maintain a controlling stake, and in 36 cases they keep a majority stake.

There is some evidence that repurchased subsidiaries are those with high agency costs. A total of 67% of reacquired subsidiaries are included in one of our groupings of subsidiaries that are prone to agency problems. This compares to 61% for subsidiaries that are not reacquired. This difference is explained by the higher probability of sales relationship subsidiaries being reacquired. A total of 48% of reacquired subsidiaries have a sales relationship with their parents, but only 40% of other subsidiaries do. Not surprisingly, reacquisition is slightly more likely when the parent retains a majority stake postlisting.

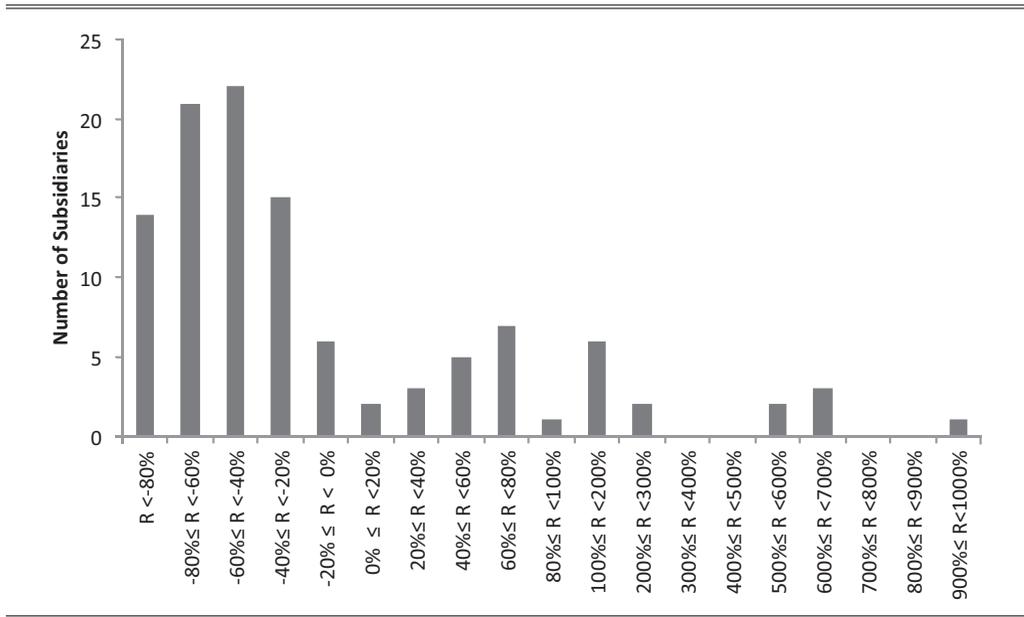
#### B. Performance of Repurchased Subsidiaries

According to the view that parents list these firms when they are overvalued and repurchase them once mispricing corrects, we should generally observe repurchases to occur at a discount to

<sup>29</sup>Specifically, if a top shareholder owns more than 75% of shares for a year or more than 90% of shares at any time, the firm is subject to delisting. Minority shareholders fear delisting because of the illiquidity of unlisted equity.

**Figure 3. Buy-and-Hold Returns to Repurchased Subsidiaries**

This figure shows The distribution of buy-and-hold returns earned by subsidiaries that are repurchased by their parent firm or another affiliated entity. Returns are measured from the beginning of the month following the subsidiary listing until the repurchase date.



the listing price. Figure 3 shows evidence consistent with this idea. It shows a histogram of the buy-and-hold return of repurchased subsidiaries from the end of the listing month until the time of their repurchase. In 78 out of 109 cases, the returns are negative. Although there are 14 cases in which returns exceed 100%, median buy-and-hold returns are  $-41.5\%$ . Thus, in the typical case parents repurchase their subsidiaries at a considerable discount to the listing price.

Are subsidiary reacquisitions perceived as good news for parent firm shareholders? Table VIII summarizes reacquisition announcement returns for parents and subsidiaries. Parent announcement returns are positive and statistically significant. Market-adjusted returns during the five-day window around announcement are  $1.76\%$ , which is equivalent to approximately  $18\%$  of the subsidiary’s stock market value because the average market capitalization of repurchasing parent firms is much larger than that of subsidiaries. This is in contrast to the typically negative announcement returns for acquirers in the United States (Andrade, Mitchell, and Stafford, 2001), typically insignificant returns for controlling shareholder acquirers in the United States (Bates, Lemmon, and Linck, 2006), and typically insignificant returns for acquirers in Japan (Pettway and Yamada, 1986; Kang, 1993; Kang, Shivdasani, and Yamado, 2000).<sup>30</sup> Panel B of Table VIII shows that subsidiaries also experience positive announcement returns, with market-adjusted returns during the five-day window around announcement of  $9.49\%$ , reflecting modest takeover premia. Thus, consistent with our predictions, parent firms are able to capture some of the gains from these transactions.

<sup>30</sup>See also Ito (1989), Komoto (2002), Yeh and Hoshino (2002), and Yeh (2007).

**Table VIII. Reacquisition Announcement Returns**

This table reports buyer and target abnormal announcement returns for subsidiaries reacquired by the parent company or by another entity affiliated with the parent. Market-adjusted returns calculated over four different event time windows are reported. Out of 109 reacquisitions in the sample, two have missing announcement dates. In eighteen cases, the buyer announces multiple acquisitions on the same day. Four observations of buyer and target returns are lost due to missing price data. In calculating buyer announcement returns, only one observation per announcement is included. Robust *t*-statistics are reported in parentheses.

<b>[0,0]</b>	<b>[-1,0]</b>	<b>[-1,1]</b>	<b>[-2,2]</b>
<i>Panel A: Buyer Announcement Returns</i>			
0.835** (2.626)	0.649* (1.783)	1.803*** (2.927)	1.762** (2.276)
<i>Panel B: Target Announcement Returns</i>			
1.611* (1.854)	2.492** (2.607)	8.561*** (4.678)	9.486*** (4.623)

\*\*\*Significant at the 0.01 level.  
\*\*Significant at the 0.05 level.  
\*Significant at the 0.10 level.

## VI. Conclusion

In perfectly efficient markets, minority shareholders anticipate the full extent of agency problems and form unbiased estimates of the cash flows they will receive. If the controlling shareholder is expected to divert resources, minority shareholders price the equity accordingly, and it is the controlling shareholder who ultimately bears all agency costs. Controlling shareholders thus require substantial benefits to motivate them to sell shares to dispersed outside investors. The existing literature focuses on motivations related to financial constraints. Our findings suggest another possible, though not mutually exclusive, explanation: stock mispricing offsets agency costs and induces a controlling shareholder to raise capital. Higher misvaluations are required to support the creation of ownership structures that give rise to more expropriation.

We test our ideas by studying the public listing of subsidiaries by Japanese corporations. We find evidence consistent with three main hypotheses. First, subsidiaries in which the parent firm retains only a 20% to 50% ownership stake experience poor stock returns following their listing. Among these subsidiaries, controlling shareholders have effective control but limited cash flow rights, creating incentives for them to divert resources from the subsidiary. Second, performance is poor among subsidiaries for which there is greater *ex ante* scope for agency problems, namely, those that maintain a sales relationship with the parent firm. Third, a quarter of the subsidiaries listed during our sample period are repurchased by their parent. When such repurchases are announced, shareholders in parent firms and subsidiaries experience positive announcement returns. In the majority of these repurchases, the parent takes the subsidiary private at a discount to the listing price. We interpret these findings about repurchases as consistent with the idea that controlling shareholders repurchase subsidiaries once mispricing reverts because the costs of diversion are recurring.

We have been careful in the paper not to speculate about the source of stock market mispricing. An interesting possibility to consider is that the mispricing itself comes from investors

underestimating the agency problems. Such an interpretation would be consistent with regulators' frequently expressed concern that investors will not be able to understand conflicts of interest, even with abundant disclosure.<sup>31</sup> It is also consistent with previous empirical evidence. Cain, Loewenstein, and Moore (2005), for example, show that decision makers tend to ignore conflicts of interest, even when such conflicts are prominently disclosed. Perkins, Morck, and Yeung (2008) show that joint ventures between Brazilian telecommunications firms and foreign partners are more likely to fail if the foreign partners are from countries with few business groups, suggesting that these partners underestimate the agency problems from dealing with firms that are part of business groups. Malmendier and Shanthikumar (2007) suggest that retail investors are naïve regarding incentives.

The idea that parents list subsidiaries when investors underestimate agency problems is further supported by the fact that parents do not set up strong monitoring systems *ex ante*. One way to cultivate strong monitoring would be to maintain an independent board of directors. But even as recently as 2008, almost half of publicly listed subsidiaries did not have a single outside director. For those that did, two-thirds of outside directors were executives of the parent firm.<sup>32</sup> Another way for firms to bond themselves would be by cross-listing on a U.S. stock exchange, as indicated by Reese and Weisbach (2002) and Doidge et al. (2009). Despite the popularity of American Depositary Receipts (ADRs) among Japanese firms—they constitute almost 15% of the market capitalization of all ADRs—only two out of 431 subsidiaries in our sample have a sponsored ADR program.<sup>33</sup> Thus, even though stronger monitoring mechanisms are available, parents almost invariably choose not to use them, consistent with investors underestimating agency problems.

An important implication of our findings is that market timing can have consequences beyond wealth transfers between different groups of investors. If at least some of the agency costs are deadweight costs—costs that the controlling shareholder incurs when taking actions to cover up the resource diversion or costs that are a consequence of distorted investment and R&D decisions—then the socially optimal level of equity sold to minority shareholders is likely to be lower than observed in practice. This means that mispricing may promote inefficient ownership structures and may help explain the widespread existence around the world of ownership structures that are prone to agency problems, including pyramids, business groups, and dual-class shares.

## Appendix: Mispricing in a Standard Agency Model

Here, we provide a formal model corresponding to the discussion in Section I. There are three periods: 0, 1, and 2. At time 0, a controlling shareholder owns all equity in a firm that will generate \$1 of cash flow in periods 1 and 2. The controlling shareholder considers selling fraction  $\alpha$  of firm equity to the dispersed outside investors. The firm generates gross cash flow of \$1 in periods 1 and 2, irrespective of whether the controlling shareholder raises external capital.

Once the equity has been listed, an agency problem arises: the controlling shareholder prefers to divert cash flow to himself instead of receiving only his pro rata share. Diverting fraction  $\theta$  of cash flow costs the controlling shareholder  $C(\theta) = k\theta^2$  each period. Parameter  $k$  can be interpreted as the inverse of the scope for agency problems.

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<sup>31</sup>Consider, for example, the recent decision of the Securities and Futures Commission of Hong Kong to allow shares of United Company RUSAL to be listed on the Hong Kong Stock Exchange. The regulator prevented retail investors from participating, despite the risks being prominently disclosed in a thousand-page prospectus.

<sup>32</sup>These figures are drawn from the TSE (2009).

<sup>33</sup>This figure is based on data from the Bank of New York Mellon Depositary Receipts Directory.

In period 0, the controlling shareholder chooses fraction  $\alpha$  of the firm to sell to the public at price  $P$  per share. In periods 1 and 2, the firm produces \$1 of cash flow, the controlling shareholder diverts fraction  $\theta$  of this cash flow, and the remaining  $1 - \theta$  dollars of cash flow are distributed pro rata.

The controlling shareholder's decisions at  $t = 1$  and  $t = 2$  are identical. That is, each period he diverts  $\theta$  to maximize

$$\max_{\theta|\alpha} (1 - \alpha)(1 - \theta) + \theta - k\theta^2. \quad (\text{A1})$$

The first term is his pro rata share of the postdiversion cash flow, the second term is the amount diverted, and the last term is the cost of diversion. Differentiating yields the solution

$$\theta = \frac{\alpha}{2k}, \quad (\text{A2})$$

reflecting the idea that the lower is the controlling shareholder's share of cash flow rights,  $1 - \alpha$ , the stronger is his incentive to divert. Substituting (A2) into the expression for  $C(\theta)$ , we see that total equilibrium costs of diversion across periods 1 and 2 are  $\alpha^2/2k$ , which is decreasing in  $k$ .

## 1. Introducing Mispricing into the Agency Model

We start by analyzing the case in which the controlling shareholder has one opportunity to sell equity in the initial period (at  $t = 0$ ). He maximizes total proceeds,

$$\begin{aligned} \max_{\alpha} & 2(1 - \alpha)(1 - \theta) + 2\theta - 2k\theta^2 + \alpha P_0 \\ \text{s.t. } & \theta = \frac{\alpha}{2k}, \end{aligned} \quad (\text{A3})$$

where  $P_0$  is the per share price of the equity at  $t = 0$ . In the standard rational expectations framework,  $P_0$  would be set to reflect the level of diversion, that is,  $P_0 = 2 - 2\theta$ . We deviate from this and allow stock prices to be misvalued by an error term  $\varepsilon$ :

$$P_0 = 2 - 2\theta + \varepsilon. \quad (\text{A4})$$

Substituting (A2) and (A4) into (A3) and differentiating yields

$$\alpha = k\varepsilon. \quad (\text{A5})$$

Equation (A5) obtains because the controlling shareholder trades off the benefit of selling overvalued equity against the agency costs. If shareholder protection is strong, or  $k$  is high, very little overvaluation is required to motivate the controlling shareholder to sell shares. Equation (A5) directly reflects our first and second predictions.

What is the net benefit from selling overvalued shares? Simple algebra shows that by selling  $\alpha = k\varepsilon$  shares to outside investors, the controlling shareholder gets  $\frac{1}{2}k\varepsilon^2$  more than if he does not sell any shares at all and retains full control. In equilibrium,  $\theta = \varepsilon/2$ .

If prices instantly revert to the rational expectations level  $P_0 = 2 - 2\theta$ , postlisting percentage returns realized by minority investors are given by

$$R^{postlisting} = \frac{2 - 2\theta}{2 - 2\theta + \varepsilon} - 1 = \frac{-\varepsilon}{2} \quad (A6)$$

Although postlisting returns are not an explicit function of  $k$ , the inverse of the scope for agency problems, mispricing has to be greater to induce the controlling shareholder to list shares when the scope for agency problems is great.

## 2. Temporary Mispricing and Repurchasing Equity after Listing

We now analyze the case in which mispricing corrects in period  $t = 1$ . Suppose that after this period, mispricing disappears, such that the price accurately reflects the remaining dividends accruing to minority shareholders in period 2, that is,  $P_1 = 1 - \theta$ . Suppose further that the controlling shareholder has the opportunity to repurchase equity at this price (meaning that he captures the full surplus of eliminating the agency costs).

We first show that repurchasing the equity at the end of  $t = 1$  is positive NPV. At this time, the controlling shareholder compares the payoff of repurchasing the equity with the payoff from simply continuing to collect a dividend and divert revenues.

The remaining payoff from repurchasing is given by the full output of one unit minus the cost of repurchasing the equity:

$$\text{Payoff}(\text{repurchase}) = 1 - k\varepsilon(1 - \varepsilon). \quad (A7)$$

If the controlling shareholder retains his stake, he simply collects his pro rata dividends and diversion payments, as well as incurs the costs of diversion:

$$\text{Payoff}(\text{retain stake}) = (1 - \alpha)(1 - \theta) + \theta - k\theta^2 = 1 - k\varepsilon + \frac{k\varepsilon^2}{4}, \quad (A8)$$

where (A8) is less than (A7), that is, repurchasing is positive NPV.

We also show that in period 0, understanding that the mispricing is temporary and that he will have a chance to repurchase shares in period 1, the controlling shareholder sells more equity. Specifically, at  $t = 0$ , he maximizes the payoff

$$\text{Payoff} = (1 - \alpha)(1 - \theta) + \theta - k\theta^2 + \alpha[2(1 - \theta) + \varepsilon] + 1 - \alpha(1 - \theta). \quad (A9)$$

The first terms represent the payoffs from dividends in the first period, net of agency costs. The next terms are the proceeds from selling equity at the end of  $t = 0$ . The last terms are the  $t = 2$  profits net of the price paid to get the shares back at the end of  $t = 1$ . This expression can be rewritten as

$$\text{Payoff} = 2 - k\theta^2 + \alpha\varepsilon. \quad (A10)$$

Substituting for  $\theta$  and differentiating yields the first-order condition  $\alpha = 2k\varepsilon$ . This is similar to our previous solution in (A5), but multiplied by two. The difference arises because if the controlling shareholder knows the mispricing is temporary, he anticipates being able to buy back

the equity and thus having to bear fewer periods of agency costs. As a result, he is willing to sell more equity in the initial period.

Our analysis depends critically on the bargaining power of the controlling shareholder. Suppose, for example, that he could repurchase shares at  $P = 1$ , their fair value conditional on the controlling shareholder having full control. In this case, the minority shareholders capture the full surplus from eliminating agency costs, and the majority shareholder will prefer to hold onto his shares. We thus have the free rider problem identified by Grossman and Hart (1980): even though the parent firm can create value by eliminating agency costs, it does not go through with the acquisition because dispersed minority shareholders capture the full surplus. In our empirical application, we argue that Japanese squeeze-out laws and delisting rules, however, yield considerable negotiating power to the parent firm, enabling it to capture some of the gains associated with repurchases.

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